STEVEN W. HAMMOND

OBJECTIVE

Lead and manage a world-class computational sciences organization through the rapidly changing frontier of high performance computing, networking, and information technology.

RESEARCH INTERESTS

Parallel numerical computing. Efficient massively parallel computing. Runtime environments and preprocessing for mapping unstructured grid computations to parallel computers. Graph theory, interconnection networks, and computer architecture. Software engineering and management of scientific simulation codes.

EDUCATION

1992	Ph.D., Computer Science Rensselaer Polytechnic Institute	Troy, NY
1984	M.S., Computer Science University of Rochester	Rochester, NY
1983	B.A., Mathematics University of Rochester	Rochester, NY

EXPERIENCE

2002 - Computational Sciences Center, Golden, CO
Science and Technology Directorate,
National Renewable Energy Laboratory

Center Director

- Responsible for NREL's Laboratory-wide efforts in computational science.
- Scope, plan, and develop a Lab-wide Computational Science Facility, including infrastructure and staffing.
- Identify and pursue strategic funding opportunities, both for NREL and in collaboration with other federal laboratories and help build a culture of computational science that contributes to research quality and to the development of new computational science capabilities.
- Provide leadership in high performance computing for NREL and its programs.
- Initiate and oversee innovative research programs in programmatically relevant areas of computer science, mathematics, and scientific computing
- Establish and maintain productive external contacts and relationships in the scientific, university, government, and industrial communities.

1996 - 2002 Computational Science Section, Boulder, CO
Scientific Computing Division, NCAR

Section Manager

- Lead a staff of twelve in conducting research and development in areas such as computational fluid dynamics and parallel communications algorithms for highly parallel

architectures. Additionally, Section staff develops software packages and computational techniques to make use of this research in atmosphere, ocean, and geoscience models.

- Manage the technology tracking activity - conduct performance modeling and benchmarking. Advise NCAR/UCAR staff and management on current capabilities and future trends in computing.
- Technical lead in NCAR supercomputer procurements.

1992 - 1996 Computational Science Section, Boulder, CO
Scientific Computing Division, NCAR

Software Engineer

- Collaborate with NCAR and University scientific staff on implementation of large production geoscience applications.
- Technical lead on project to develop a data parallel version of 3D atmospheric general circulation model.
- Research in the area of parallel numerical computing - communication and computational algorithms.
- Technical lead on $35M supercomputer computer procurement - led development of benchmark suite and member of a small team evaluating proposals.

1992 European Center for Research and Toulouse, France
Advanced Training in Scientific Computation

Post Doc

- Research in runtime systems for mapping unstructured grid problems to massively parallel computers.
- Developed out of core LU solver on CM-2 for very large complex symmetric dense matrices arising in the solution of Maxwell's equations by the boundary integral method.

1988–1992 Research Institute for Advanced Moffett Field, CA
Computer Science, NASA Ames

Visiting Research Associate

- In collaboration with NASA scientists, conducted research in the area of mapping unstructured grid problems to massively parallel computers.

1987–1988 Rensselaer Polytechnic Institute Troy, NY

Research Assistant

- Conducted research in iterative methods for solving large sparse linear systems of equations on shared memory multiprocessing machine.

1984–1987 Corporate Research and Development Center Schenectady, NY
General Electric Co

Computer Scientist

- Research and development in the area of algorithms and special purpose architectures for computational numerical lineal algebra.
- Two patents issued concerning method and apparatus for efficient sparse matrix operations.

SOCIETY MEMBERSHIPS

- Member, IEEE
- Member, Sigma Xi, Scientific Research Society of North America

HONORS AND AWARDS

- Nominated for NCAR Annual Performance Award in the "Technology Advancement" category, December 1994.
- Nominated for ACM Distinguished Dissertation Award, 1992.
- IBM Doctoral Fellowship, 1988-1989.
- GE Managerial Award, for research in Sparse Matrix Computations, July 1986.
- GE Patent Award, for filing Most Promising Patent in first half of 1986.

PROFESSIONAL ACTIVITIES

- Member of DOE Science Case for Large-scale Simulation (SCaLeS) workshop organizing committee and co-chair of the Software Engineering and Management breakout group, June 2003.
- Member of Technical Papers Committee for IEEE Supercomputing2003 Conference, Phoenix, AZ.
- PACI Review Panel member, Annual review of NSF PACI program, October 2002
- Advisory Panel Member, Arctic Region Supercomputing Center, Fairbanks, AK, March 2002.
- Member of Technical Papers Committee for IEEE Supercomputing2002 Conference, Baltimore, MD.
- Member of the organizing committee for the international workshop, Computers in Atmospheric Sciences 2001 held October 29 - November 1 in Annecy, France.
- PACI Review Panel member, Annual review of NSF PACI program, October 2001
- Advisory Panel Member, Arctic Region Supercomputing Center, Fairbanks, AK, February 2001.
- Member, NERSC Program Allocation Committee, National Energy Research Scientific Computing Center, Lawrence Berkeley Lab, CA, September 1999-2001.
- Member of the IEEE Computer Society Technical Committee on Supercomputer Applications Executive Committee.
- Member of Technical Papers Committee for IEEE Supercomputing98 Conference.
- Member of Scientific Program Committee for the Second International Workshop on Software Engineering and Code Design in Parallel Meteorological and Oceanographic Applications, Scottsdale, AZ, June 1998.
- Member of Technical Papers Committee for IEEE Supercomputing97 Conference.
- Member of Technical Papers Committee for IEEE Supercomputing96 Conference.
- Co-organizer of the 5th PDEs on the Sphere Conference (with Jim Hack, Paul Swarztrauber, and Dave Williamson), held in Breckenridge, CO, June 11-14, 1996.
- Chair - NCAR Employment Activity Committee, 8/93-8/94
- Member - NCAR Employment Activity Committee, 11/92-12/94
- Co-organizer of 7th Parallel Circus (with Gene Golub and Robert Schreiber), held at Stanford University, March 30-31, 1990.
- Graduate student representative -- Search Committee for Dean of Science at R.P.I., 1988
- President - IEEE Computer Society, Schenectady, NY Chapter, 1986-1987

FUNDING: GRANTS AND COOPERATIVE AGREEMENTS

- Co-PI on a $3M, three year DoE grant, 1999, "Earth System Grid" providing virtual proximity to scientist, data, and computational and analysis resources to advance atmospheric sciences research. Collaboration with scientists at ANL, LBL, LLNL, and Cal Tech.

- Co-PI on the NCAR/Department of Energy Cooperative Agreement, June 1996 - June 2001. This work was formerly called the CHAMMP project but it has been restructured into a 5 year cooperative agreement where CSS staff collaborate with scientists and programmers in CGD to develop portable coupled climate models capable of running efficiently on highly parallel distributed memory computers. SCD receives approximately $220K per year for this work.

PUBLICATIONS

Swarztrauber, Paul N. and Steven W. Hammond, "A Comparison of Optimal FFT's on Torus and Hypercube Connected Multicomputers," *Parallel Computing,* **27** (2001) 847-859.

Hammond, et al, "Towards a Robust, Agile, and Comprehensive Information Infrastructure for the Geosciences: A Strategic Plan For High Performance Simulation" http://www.ncar.ucar.edu/Director/plan.pdf May 21, 2000.

Drake, John B., Steve Hammond, Rodney James, and Patrick Worley, "Performance Tuning and Evaluation of a Parallel Community Climate Model," in *Proceedings of Supercomputing 1999*, Portland Oregon, November 1999.

R. James, T. Bettge and S. Hammond, "Portability and Performance of a Parallel Coupled Climate Model." to appear in proceedings of Second International Workshop on Software Engineering and Code Design in Parallel Meteorological and Oceanographic Applications, Scottsdale, Arizona, June 1998.

Hammond, S. W., R. D. Loft, and P. D. Tannenbaum, "Architecture and Application: The performance of the NEC SX-4 on the NCAR Benchmark Suite," *Proceedings of SuperComputing 96*, Pittsburgh, PA, November 1996.

Hammond, S. W., R. D. Loft, J.M. Dennis, and R.K. Sato, "Implementation and Performance Issues of a Massively Parallel Atmospheric Model," *Parallel Computing*, 21 (1995) 1593-1619.

Hammond, S. W., R. D. Loft, J. M. Dennis, and R. K. Sato, Massively Parallel Atmospheric Modeling at NCAR, in *Proceedings of Sixth ECMWF Workshop on Parallel Computing and Weather Forecasting*. World Scientific, November 1994, pp. 395-406.

Hammond, S. W., R. D. Loft, J. M. Dennis, and R. K. Sato, "A Data Parallel Implementation of the NCAR Community Climate Model (CCM2)," in *Proceedings of 7th SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 1995, pp. 125-130.

Mapping Unstructured Grid Problems to Massively Parallel Computers, Ph.D. Thesis, Rensselaer Polytechnic Institute and RIACS Technical Report TR 92.14, June 1992.

Hammond, S. W. and R. Schreiber, "Efficient ICCG on a Shared Memory Multiprocessor," *International Journal of High Speed Computing*, Vol. 4, No. 1, March 1992, pp. 1-21.

Hammond, S. W. and T. J. Barth, "An Efficient Massively Parallel Euler Solver for Unstructured Grids," *AIAA Journal*, Vol. 30, No. 4, April 1992, pp. 947-952.

Hammond, S. W. and T. J. Barth, "An Efficient Massively Parallel Euler Solver for Unstructured Grids," AIAA paper 91-0441, in Proceedings of *29th AIAA Aerospace*

Sciences Meeting, Reno, NV, January 1991.

Hammond, S. W. and R. Schreiber, "Mapping Unstructured Grid Problems to the Connection Machine," Oct. 1990, Proceedings of *Unstructured Scientific Computation on Scalable Multiprocessors*, R. Voigt Editor, Kill Devil Hills, N.C., October 29-31, 1990, and RIACS Technical Report 90-22.

Hammond, S. W. and R. Schreiber, "Efficient ICCG on a Shared Memory Multiprocessor," *International Journal of High Speed Computing*, Vol. 4, No. 1, March 1992, pp. 1-21, and RIACS technical report 89.24, May 1989.

Law, H. K., and S. W. Hammond, "Architecture and Operation of a Systolic Engine for Finite Element Computations," *J. Computers and Structures*, Vol. 30, No. 1/2, pp. 365-374, October 1988.

INVITED PRESENTATIONS

Keynote Address. "The Role of Computational Science in Energy Efficiency and Renewable Energy," International Parallel Architecture and Compiler Technology conference, University of Virginia, September 2002.

"The Role of Computational Science in Energy Efficiency and Renewable Energy," Oregon State University Computer Science Dept., April 2002.